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# The Economic Plants of the Bible<sup>1</sup>

*Biblical peoples of the Holy Land and adjacent parts of the Old World were as dependent upon plants for food, spices, cosmetics, drugs, medicines, textiles and other products as is modern man, and more than 125 such plants are recognizably referred to in the Scriptures.*

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Of the 242 species and varieties of plants thus far identified in the text of the Holy Scriptures, about 133—or more than 50 percent—may be classified as economic plants of the people of that time and region. That the percentage should be so high is not surprising, since it is a well known fact that ancient peoples usually referred to and even had names for only such plants in their natural environments as were of some immediate concern or value to them. The fact that so many of these economic plants have been referred to in the books that comprise our Old and New Testaments and Apocrypha—some of them repeatedly and in books by various authors—is ipso facto evidence that they must have been of considerable importance.

We may roughly divide the economic plants of the Bible into six categories: (a) those used for food; (b) those used as spices and condiments; (c) those used as cosmetics, drugs and medicines; (d) those furnishing textiles; (e) those used for fuel and construction; and (f) those with miscellaneous domestic uses. These groupings are not mutually exclusive. Many species could properly be placed in two or more of the groups.

<sup>1</sup> Material for this article has been taken, in large part, from the book "Plants of the Bible," by H. N. and A. L. Moldenke, published by Chronica Botanica Co., Waltham, Mass., in 1952. \$7.50.

The six most important food plants of the people of Bible times were, without doubt, figs, dates, olives, barley, spelt and wheat. Next in importance were probably millet, pomegranates, apricots and grapes.

## Food Plants

**Fig.** The common fig (*Ficus carica*) is mentioned about 73 times, from the third chapter of Genesis to the sixth chapter of Revelation. It is the very first plant to be noted by name in the Old Testament, in connection with its leaves being used to make aprons by Adam and Eve in the Garden of Eden—although John Milton and others have felt that the "fig" intended in this allegorical story may have been the banyan. The edible fig was probably first cultivated in the fertile parts of southern Arabia. From there its cultivation spread throughout the Mediterranean area. Five different Hebrew words are used in the Old Testament to refer to this fruit—one refers to the tree itself, one to the fruit as such, another to the green or unripe fruit which remains on the tree all winter, another to the early or first-ripe fruit, and the fifth to the cakes of dried figs kept for winter use as a staple article of food. Part of the present sent to King David by Abigail about 1000 B.C. consisted of 200 cakes of figs.

The fig tree, when allowed to grow normally, produces dense shade, and it was therefore used extensively in Bible times, as now, as a shade tree in the courtyards of houses and at wells. Normally two crops of fruit are produced per year, the first or winter figs ripening in June, the second or summer figs on the new wood in August and September. Often when the summer figs are just beginning, some ripe winter figs may still be found lingering on the branches, half hidden in the foliage. It was for these that Jesus looked in the well known story recorded in Matthew 21: 19-21. It is the summer crop which is preserved for use in winter, and these figs, when dried, are made into cakes or are kept hung on strings. Baskets, dishes and umbrellas have been made since ancient times in Bible lands by sewing fig leaves together—and, of course, a fig leaf is still the traditional apron used by sculptors on their statues of the human form. In Old Testament times a poultice of crushed figs was used in the treatment of boils, warts, rashes and other cutaneous afflictions, just as Isaiah applied it to cure King Hezekiah (II Kings 20: 7).

The importance and value of the fig tree to the Israelites is illustrated very graphically in the fact that whenever the prophets censured the people for their wickedness, they threatened that the vine and fig crops would be destroyed, and when they wanted to extend the promise of great reward they said that the vine and fig crops would be restored. "To sit under one's own vine and one's own fig tree" became a proverbial expression to denote peace and prosperity.

Another of the important economic plants of Bible times was the sycomore-fig (*Ficus sycomorus*). This tree produced a fruit that was decidedly inferior to that of the common fig, but, like it, produced several crops a year. It was abundant in Egypt, where its soft but

durable wood was used for making mummy-coffins as well as doors, furniture and boxes. It grew abundantly in valleys and lowlands, and because of its wide-spreading branches gave a very welcome shade along roadsides and caravan routes. It was one of the most valuable fruit trees of Jericho and Canaan. In Palestine it was intimately connected with the mysterious rites of nature-worship against which the Hebrew prophets inveighed so often. In order to obtain ripe edible fruits each one must be cut or pared at the top center a few days before picking. This dressing of the sycomore-figs was the prophet Amos' job.

**Date.** The date palm (*Phoenix dactylifera*) is mentioned no less than 48 times, also from the first to the last books of the Bible. It was at one time as characteristic of Palestine as it was of Egypt, occurring in some districts in dense groves, in other areas as isolated trees, providing excellent landmarks. Widely employed as a model for ornamentation in the Orient, its stems and leaves were the favorite subjects for architectural embellishment—usually in relief—from the time of building Solomon's temple. The capitals of Egyptian temple and palace columns were conventionalized from the handsome terminal crown of leaves of this tree, and this form of capital persists in our present architecture. The leaves were used to thatch roofs, and were hung on walls to provide insulation and on reed fences to give more impermeable solidity. Young leaves were gathered and tied in bunches to make brooms and dusters for housework. The leaflets were woven into mats, baskets and dishes. The web-like fiber at the base of the leaves was woven into cord and rope. The fruit has always been the chief article of food for all dwellers on the Arabian and north African deserts. The water-soaked or ground-up kernels were fed to camels,

sheep, goats and cows. Women made necklaces and bracelets from the dried kernels. It is supposed that the "strong drink" mentioned in the Bible as distinct from wine was made from the syrupy liquid which exudes when unopened flower-spathes are pierced. This partially solidified syrup is also what the Israelites often referred to when they spoke of "honey". The Arabs today have a saying that the date palm has as many uses as there are days in the year, and this hardly seems to be an exaggeration.

Because of the gracefulness of the date palm tree, it became symbolic of grace and elegance to the Israelites, and the name of this tree—"tamar" in Hebrew—was often bestowed on women in allusion to their graceful upright carriage. Even today in Palestine Tamar and Tamarah are popular as girls' names.

**Olive.** It has been stated that no other tree is more intimately associated with the human race and the development of western civilization than the olive (*Olea europaea*). In the Scriptures it is referred to more than 95 times. The dove sent out by Noah returned with an olive leaf, and on this account both the dove and olive have become symbols of peace. Not only was the fruit of great value because of its edible qualities, both in the ripe and unripe state, but most of the oil used in Bible times was expressed from its outer fleshy portions. This oil was used in cookery, in sacrificial offerings, as fuel for lamps, as a tonic for hair and skin, medicinally in surgical operations, and also for the anointing of kings and high priests. One of the punishments meted out to the allegorical Babylon in the Apocalypse of John was that no one would buy her olive oil. The olive tree to Oriental peoples has always been a symbol of prosperity and divine blessing, beauty, luxuriance, strength and sovereignty. It was so extensively

cultivated that in the Bible we often find the word "oliveyards" coupled with vineyards and grainfields in descriptions of the wealth of the land. Almost every village had its olive grove, and wealthy landowners had olive "gardens" into which they retired during the heat of the day. Olive oil formed the basis of the perfumed ointments mentioned in many passages.

In Bible times the fruit of the olive tree was normally gathered by shaking or beating the tree, but the Mosaic law demanded that a few fruits always be left on the tree for the poor, the stranger, the widow and the orphan to gather.

**Barley.** The "corn" of the Bible, like that of the Old World countries today, was what we in America mostly refer to as "grain". Cornfields were not fields of tasseled cornstalks or rows of wigwam-shaped six- and eight-foot stacks, but were fields of barley, spelt and wheat.

The barley of ancient times is thought to have been the common barley (*Hordeum distichon*), winter barley (*H. hexastichon*) and spring barley (*H. vulgare*). It is referred to by name 32 times in 15 of the Bible's 92 books. Being less expensive than wheat, it was the staple cereal grain used, either by itself or mixed with wheat or other seeds, by the poorer people. It was in many places the sole feed for horses, and was commonly employed for feeding asses, draught oxen and cattle.

No other grain cultivated by man can equal barley in the amount of climatic variation under which it has been grown successfully. It survives heat and drought better than any other cereal crop. It ripens so rapidly that the short summers of far northern and far southern latitudes—much too short for the production of a wheat crop—are quite sufficient for it. It is still the typical crop in the steppe-like Irano-Turanian region of Palestine where there is only a very

small annual rainfall. In Bible times the barley harvest was usually in March or April, or, in the hilly districts, perhaps as late as May. Mostly the barley harvesting was completed one to three weeks earlier than that of wheat. Today barley ripens about a month earlier than wheat in Egypt, just as it did in 1290 B.C. when a sudden hailstorm destroyed all Pharaoh's barley (which was already matured) but not his wheat.

So well was barley known to the Israelites that it supplied them with a unit of linear measurement—two barley grains making a “finger-breadth”, 16 a “hand-breadth”, 24 a “span”, and 48 a “cubit” or 16 inches. Measurements based on this unit were more exact than those based on the variable width or length of a man's middle finger, the extent of his spread hand, or the length of his forearm. This unit has, in fact, been used for ages in the measurement of shoes.

Ten wild species of barley now grow in the Holy Land area, and one of them, *H. spontaneum*, may be the ancestor of the cultivated species and varieties. At about the end of the first century A.D., when John is thought to have written the Apocalypse, wheat was valued at about a dollar and barley at 33 cents per quart. Leviticus 27: 16 is rendered by Dr. Moffatt as “land sown with ten bushels of barley shall be valued at seven pounds of silver”—or by present standards about \$76.

Since barley was the commonest food of the poorest people in Bible times, it is used symbolically in the Scriptures to indicate poverty, cheapness or worthlessness. Hosea purchased for 120 bushels of barley an adulteress for wife. The jealousy offerings described in Numbers 5: 15 consisted of only a little more than three quarts of barley. Ezekiel exclaims in shocked insult over the profaning of the law for mere handsful of barley. All these examples indi-

cate how the Hebrews, with minds geared to seeing symbolism anywhere, attempted to indicate contempt for the implicated parties. Gideon, being a very poor and humble man, in his dream (Judges 7: 13–15) compares himself to a “cake of barley bread”.

**Wheat.** Just what the wheat was which is referred to 175 times in the Bible is a matter of much speculation. Five kinds of wheat are native to and still wild in Palestine today, and at least eight others are cultivated there. It is probable that most, or even all, of these were used in Bible times. The native ones were undoubtedly much more abundant there in those days than they are now. They included the one-grained wheat, einkorn, or little spelt (*Triticum monococcum*), the thaoudar (*T. thaoudar*) and the wild wheat or wild emmer (*T. dicoccoides*). The non-native spelt (*T. aestivum* var. *spelta*) is mentioned in three places in Exodus, Isaiah and Ezekiel, and the composite wheat (*T. compositum*) is very definitely referred to in Genesis 41: 5–27. The latter species, with its branched spikes—often as many as seven “ears” or heads per stalk—is depicted on numerous Egyptian monuments and inscriptions and is the common “mummy wheat” of the Nile delta and the “Heshbon wheat” of Palestine.

It is generally agreed, however, that most of the Biblical wheat was *T. aestivum* which yields the summer and winter wheat of today. This species has been cultivated in Bible lands since the earliest recorded times and may have had its origin in the area now flooded by the Mediterranean Sea. It was the principal cereal grain of Mesopotamia in Jacob's time. Babylon, Syria and Palestine were all well known in ancient times for the excellence of their wheat, but frequent droughts often resulted in widespread famine (Psalms 81: 16 and 147: 14, Genesis 12: 10 and 41: 57).

From the time of King Solomon onward the Hebrews gave up their nomadic existence, and agriculture became more developed among them. Palestine then became a grain-exporting land, her surplus mostly absorbed by Tyre, her powerful commercial neighbor to the north (Ezekiel 27: 17, Amos 8: 5), whose ships sailed all the then-known seas.

Wheat was trodden out by oxen (Deuteronomy 25: 4), pressed out by a wooden wheel (Isaiah 28: 28) or threshed with a flail (I Chronicles 21: 20-23, Isaiah 41: 15-16), and then winnowed with a fan and sifted. The time of wheat harvest varied, depending on location, soil and season, from the end of April to well into June, and formed a recognized division of the year. Dates were often reckoned as so many days or weeks before or after the wheat harvest (Genesis 30: 14). Offerings to the Lord in the Temple—erroneously referred to as “meat” offerings in some translations—were cereal offerings of “fat kidneys of wheat”, i.e., of the very best grades of the very best cereal grain available.

Wheat was planted in winter by the Hebrews and was either sown broadcast and then ploughed in or trampled in by cattle (Isaiah 32: 20), or, more rarely, painstakingly set out in uniform rows to insure healthier and huskier plants (Isaiah 28: 25). Wheat and spelt were planted well after barley. The mills, millstones, granaries and threshing-floors mentioned in so many Biblical passages all refer to equipment employed in the processing of grain, mostly wheat and spelt, to produce flour. Hulled wheat intended for home consumption was often stored in the central portion of the house (II Samuel 4: 6) or in dry wells (II Samuel 17: 19). The “fine flour” used in making shewbread cakes (Leviticus 24: 5) was unquestionably wheat flour. The fermentation process by which bread is made from

cereal grain today is brought about by the yeast, *Saccharomyces cerevisiae*, and there is no reason to suppose that it was not the same yeast in Biblical days.

**Millet.** Another Biblical grain was millet (*Panicum miliaceum*), cultivated in large fields both in Egypt and in Palestine. Bread made from it is quite disagreeable to the taste and was eaten by the most abject poor. It was part of the grain fed to the prophet Ezekiel.

**Sorghum.** Dhura (*Sorghum vulgare* var. *durra*) is the common variety of sorghum in Egypt and Palestine today, and probably was also in Bible times. Its large seeds were roasted and then eaten or else were ground into a coarse type of bread. Its long stems formed the “reed” mentioned in the story of the Crucifixion.

**Pomegranate.** The pomegranate (*Punica granatum*) is mentioned no less than 44 times in the Old Testament. Certain towns were named Rimmon or Remmon because of the abundance of these fruit trees there, and an Assyrian deity mentioned in II Kings 5: 18 bore the same name and is thought to have had the pomegranate as his symbol. It is listed as one of the pleasant fruits of Egypt (Numbers 20: 5) and one of the promised blessings of Palestine (Deuteronomy 8: 8). Not only were the sweet fruits highly valued for their edibility, but cooling drinks and sherbets were made from the pulp. The astringent rind of the unripened fruit yielded a red dye, was used in medicine, and employed in tanning what we now call red Morocco leather. A mild spiced wine was made from pomegranate juice (Song 8: 2).

The pomegranate was regarded as sacred in Egypt, and in Persia adorned the head of the royal sceptre. When the Israelites built the Temple they used its perfectly symmetrical campanulate blossoms as models for interior decorations and for the embroidery on the priests’



robes. They may even have served as models for the first musical bells. The delicate beauty of the fruits caused them to be used in song and poetry in comparison with the beauty of young blushing cheeks. Today we refer to the peach in such similes. The pomegranate was cultivated in Egypt from very early times. The spies sent by Joshua to investigate the Promised Land brought back from Eshcol grapes, figs and pomegranates, thus plainly indicating that these were three of the most important products of the land. The calyx on the ripening fruit served as model for King Solomon's crown.

**Apple.** In most of our older English Bible translations the term "apple" occurs frequently. We now believe that these references are to the apricot (*Prunus armeniaca*). It is described as a tree offering pleasant shade. Its fruit was enticing to behold, sweet to taste, imparting fragrance, with restorative properties, and of a golden color, borne amid silvery leaves. Probably because of its abundance there, it gave its name to two villages in Palestine, one on the highlands of Judah and the other in the country of Ephraim. Apricots are very abundant in the Holy Land and apparently have been so since before the time of Noah. Tristram states that with the single exception of the fig, they are probably the most abundant fruit of the area, in highlands and lowlands alike, by the shores of the Mediterranean and on the banks of the Jordan, in the nooks of Judea and under the towering heights of Mount Lebanon, in the secret recesses of Galilee and in the glades of Gilead. Because of its very early flowering, the apricot was a symbol to the Hebrews of watchfulness, wakefulness or alertness, and is sometimes referred to as the "wake tree".

**Grape.** The common grape-vine (*Vitis vinifera*) is mentioned throughout the Bible, from the 9th chapter of Genesis

to the 14th of Revelation. Prophets, patriarchs, psalmists and apostles all spoke of it, often employing it in a symbolic sense. "The fruitful vine" and the "vine brought out of Egypt" were symbolic of the Jewish people. Jesus compared himself to a "true vine", of which his apostles were the branches. Use of the plant in this way indicates plainly the very high regard in which it was held by the Hebrews. It was cultivated by the ancient Egyptians and is the first plant recorded in Scripture as cultivated by man. The Promised Land was "a land of wheat and barley, of vines and fig-trees and pomegranates". The vines of Palestine were famous for their luxuriance and for the immense clusters of fruit sometimes produced. Some of these clusters were brought back on a pole from the famous valley of Eshcol by Joshua's spies. Special mention is also made in the Bible of the grapes of Sibmah, Heshbon, Elealeh and Engedi. In fact, the grape-vine became the symbol of the Jewish nation and later was adopted by the Christian church.

The ancient Hebrew usually allowed his vine to trail upon the ground or climb over rocks and walls. Later he began using supports and finally trellises. The vineyards were usually planted on a hillside, had a fig tree in each corner, and were surrounded by walls or hedges to keep out wild boars, jackals and foxes. One or more towers, usually of stone, were also built in the vineyard. In these the "vine-dressers" lived. It was their duty to prune and cultivate the vines and keep out thieves.

The time of grape-gathering was one of general festivity and usually commenced in September. The villages were then practically deserted and the people lived in temporary tents or "lodges" in the vineyards. The grapes were gathered amid much happy shouting and singing, and were carried in

baskets on the head or shoulders or else were suspended from a yoke. The choicest ones were saved for eating and stored in flat open wicker baskets. From these were also made the dried "raisins" (I Chronicles 12: 40). The rest of the harvest was carried to big stone winepresses, dug or hewn out of the rocky soil. There certain persons, the treaders, pressed out the juices by tramping on the fruit. This grapejuice could then be converted into wine through the action of the yeast, *Saccharomyces ellipsoideus*. The art of wine-making is one of the most ancient arts of mankind, and its invention is often attributed to Noah (Genesis 9: 21).

The wine made from these grapes was often converted into vinegar by addition of barley which speeded up the process of fermentation. The bacteria involved were doubtless the same as in vinegar manufacture today—*Acetobacter acetigenum*, *A. acetum*, *A. plicatum* and *A. xylinum*. The drink was very acid and, at least to some persons, somewhat nauseous; yet it was a common beverage among laborers (Ruth 2: 14). It was offered to Jesus on the cross.

**Vegetables.** The beans of the Bible were what we today call Windsor or broad beans (*Vicia faba*). This vegetable was early cultivated in Egypt, as we know from samples found in ancient Egyptian tombs. Beans were brought to King David by Barzillai, and formed part of the food of the prophet Ezekiel.

The cucumbers of Egypt for which the Israelites yearned while wandering in the desert of Sinai were our common species, *Cucumis sativus*, and the round-leaved Egyptian melon, *C. chate*. The latter, which is said to be the finest of all melon-like fruits, was widely cultivated on the floodplain of the Nile River and has been referred to as the "Queen of the Cucumbers". The melons for which they yearned, on the other hand,

were the muskmelon (*C. melo*) and the watermelon (*Citrullus vulgaris*). Both species have been cultivated in Egypt since time immemorial. The watermelon served many ancient Egyptians as food, drink and medicine. It was, for instance, the only means of relief that the poorer people had in cases of fever. For this purpose the fruit was taken when it was so over-ripe as to be almost in a state of decay. The juice was pressed out, mixed with sugar, and imbibed freely. The seeds were also roasted and salted. The watermelon season in many places extended from May through September.

About 67 kinds of onion-like plants are native to Bible lands. It is therefore not surprising that peoples of this area should have grown so fond of these plants as food. The garlic of the Bible was probably *Allium ascalonicum* and *A. sativum*, the onion was *A. cepa*, and leeks were *A. porrum* (and perhaps also the unrelated legume, *Trigonella foenum-graecum*). The onions of Egypt have the reputation of being the sweetest in the world. An inscription in the Great Pyramid of Cheops indicates that about the equivalent of three and one-half million dollars was spent to supply the workers with onions, garlic and radishes during its erection! Onions were cut in four quarters, baked and eaten, or else a soup was made of them. Richer people ate them cooked with meat.

Lentils (*Lens esculenta*) are mentioned five times in the Old Testament. They have been cultivated in Egypt and Palestine since time immemorial. Besides the well known pottage mentioned in the famous story of Jacob and Esau, a fairly good bread was made from a mixture of lentils and barley. This was eaten mostly by the poorer people.

The pods of the carob-tree (*Ceratonia siliqua*) contain a sweet mucilaginous pulp and were widely used for feeding



cattle, horses and pigs in Biblical times. In times of scarcity they were used for human consumption, and perhaps even regularly so by the poorest people. It was for some of these pods that the starving Prodigal Son longed in vain (Luke 15: 16).

Another emergency food in time of scarcity was the parasitic scarlet cynomorium (*Cynomorium coccineum*) which attaches itself to the roots of saltwort in salt marshes and on maritime sands (Job 30: 4). The host plants—probably *Atriplex dimorphostegia*, *A. halimus*, *A. rosea* and *A. tatarica*—were also gathered and eaten for their soft mucilaginous leaves. While wandering on the Sinai Desert, another source of emergency food was the “manna” (probably *Nostoc collinum*) which grew up during the night when there was a heavy fall of dew, and the “manna” which fell from the heavens (*Lecanora affinis*, *L. esculenta* and *L. fruticulosa*). It is stated that the Israelites lived on these substances for 40 years at the rate of seven pints a day per person, but this seems hardly probable. Doubtless their fare consisted of numerous more prosaic (and therefore more quickly forgotten) substances as well, and the amount used may well have become considerably exaggerated, as folklore usually is, with the passage of time.

The bulbs of the star-of-Bethlehem (*Ornithogalum umbellatum*) were ground up, after numerous boilings to eliminate the poisonous principles, and then mixed with cereal flour to make bread (II Kings 6: 25). A pint of these bulbs sold for about \$3 during a severe Samaritan famine.

**Nuts.** The only edible nuts mentioned in the Bible are walnuts (*Juglans regia*), cultivated in King Solomon's garden; pistachio nuts (*Pistacia vera*), carried down to Egypt by Joseph's brothers; and almonds (*Amygdalus communis*), used as models for ornamentation of the

candlesticks in the Tabernacle. All three of these fruits have been eaten extensively in Bible lands since very ancient times. It is believed that the village name, Betonim, mentioned by Joshua, was derived from the abundance of pistachio trees at that locality at that time, and Luz, in Genesis, refers to the abundance of almond trees.

**Herbs.** It seems very probable that the bitter herbs eaten at the time of the Passover in Bible times were much the same as those consumed on this occasion now. Some bitter herbs were almost always eaten by the Hebrews with their daily food, if available. This custom seems to have been learned from the Egyptians during the captivity because the Egyptians used to place a mixture of bitter herbs and mustard on the table and dip morsels of their food into this mixture as they ate. The bitter herbs employed by the Hebrews were probably endive (*Cichorium endivia*), chicory (*C. intybus*), lettuce (*Lactuca sativa*), watercress (*Nasturtium officinale*), sorrel (*Rumex acetosella* var. *multifidus*) and dandelion (*Taraxacum officinale*).

**Sweets.** Sugar cane (*Saccharum officinarum*) was known in Old Testament times, since it is referred to by Joshua and by Isaiah. The art of making sugar from this plant was probably unknown to the Hebrews, but the stalks were used, as they are today among primitive peoples, for sweetening foods and drinks and for chewing as a confection.

### Spices and Condiments

Because of the difficulty of preserving food in such very hot countries as Egypt, Sinai and Palestine, spices of all sorts were highly valued. Also, the usually intense heat of the sun caused copious perspiration and made the burning of incense from various resinous gums highly desirable when groups of people gathered for religious or social functions.

Spices, resins, gums and condiments were, therefore, greatly prized by the Hebrews and their neighbors, and many are mentioned in the Bible. Among these were frankincense (*Boswellia carterii*, *B. papyrifera*, *B. thurifera*), myrrh (*Commiphora kataf*, *C. myrrha*), bdellium (*C. africana*), galbanum (*Ferula galbaniflua*), nard (*Nardostachys jatamansi*), ginger-grass (*Andropogon aromaticus*), cassia-bark (*Cinnamomum cassia*), cinnamon (*C. zeylanicum*), eaglewood (*Aquilaria agallocha*), white sandalwood (*Santalum album*), red sandalwood (*Pterocarpus santalinus*), Indian orris (*Saussurea lappa*) and benzoin (*Styrax benzoin*). These were all exotic products which had to be imported from Arabia, India, Ceylon, Persia, Somaliland or Abyssinia, and were therefore very expensive and could be used only by the most wealthy. Native spices available to the poorer people included capers (*Capparis sicula*), lentisk (*Pistacia lentiscus*), labdanum (*Cistus creticus*, *C. salvifolius*, *C. villosus*), gum-tragacanth (*Astragalus gummifer*, *A. tragacantha*) and storax (*Styrax officinalis*). In this category belong also the gum mannas derived from *Alhagi camelorum* var. *turcorum*, *A. maurorum*, *Fraxinus ornus* and *Tamarix mannifera*, all native to the area.

The etrog or citron (*Citrus medica* var. *lageriformis*), although perhaps originally native to ancient Media, was certainly available to the Hebrews since very ancient times and was very widely used in ceremonials for its fragrant leaves, flowers and fruit.

Among the important condiments in Bible times were cummin (*Cuminum cyminum*) and coriander (*Coriandrum sativum*), whose astringent seeds were sprinkled over bread and pastry, and ground up with cereal grain to make flour. Other condiments were saffron (*Crocus sativus*), with which curries and stews were colored, mustard (*Brassica*

*nigra*), mint (*Mentha longifolia*), dill (*Anethum graveolens*), rue (*Ruta graveolens*, *R. chalepensis* var. *latifolia*) and nutmeg-flower (*Nigella sativa*).

### Cosmetics, Drugs, Medicines

The important cosmetic plant of the Hebrews was henna (*Lawsonia inermis*), mentioned twice in the Song of Solomon. Its leaves were dried, crushed into a powder, mixed with liquids, and made into a paste. This was used since ancient Egyptian days as a cosmetic. By means of it a bright-yellow, orange or red color was imparted to finger-nails, toe-nails, the tips of the fingers, palms of the hands and soles of the feet of young girls. The men used it for coloring their beards and the manes and tails of their horses.

Soap was made by burning the entire plants of saltwort and jointed-glasswort—chiefly *Salsola inermis*, *S. kali*, *Salicornia fruticosa* and *S. herbacea*—and then mixing the resulting ashes with olive oil. Manufacture of soap in this fashion was an important occupation along the eastern Mediterranean from remote antiquity.

At least part of the blue dye used in Bible times and mentioned in four books of Holy Scripture was derived from the lichen, *Rocella tinctoria*. The scarlet dye mentioned so often in Exodus was derived from an insect, *Coccus ilicis*, which lives on the kermes oak (*Quercus coccifera*) and has even given its name to that tree.

The ancient Egyptians were masters in the art of embalming, and in this practice they employed the inspissated juice of the aloes which grow on the island of Socotra (*Aloë succotrina*). The Hebrews, during their long captivity in Egypt, learned something of this art, and, upon their return to Palestine, tried their hand at it. The embalming fluids, however, had to be imported from afar and so were very expensive. As a result,

only wealthy or very important personages were embalmed. Nicodemus brought myrrh and aloes to embalm the body of Jesus after it was removed from the cross.

One of the many "balms" mentioned in Scripture had a medicinal use. This was the Jericho balsam (*Balanites aegyptiaca*). Its fruits were pounded and boiled to extract an oil with medicinal and healing properties. This oil was poured over open wounds and apparently acted as an antiseptic and protective covering against secondary infections. The same was done with the gum of the true balm-of-Gilead (*Commiphora opobalsamum*). This tree is native to Yemen, and the first specimens to be brought to Palestine are thought to have been carried there by the Queen of Sheba on her famous visit to King Solomon. The species was later cultivated in Palestine, chiefly about the city of Jericho, where it was still in existence at the time of the Roman conquest. The Roman soldiers carried branches from these trees back to Rome as symbols of their victory over the Hebrews. Titus Vespasian in 70 A.D. placed an imperial guard over the balm-of-Gilead orchards—so highly were they valued—but they disappeared during the later Turkish occupation.

Wormwood, derived chiefly by the Hebrews from *Artemisia herba-alba* and *A. judaica*, was an extremely bitter substance used as a tonic, stimulant and vermifuge. Because of its bitter nauseous taste it was used symbolically by Bible writers to indicate misfortune and bitter calamity. The most drastic cathartic of Bible times was derived from the colocynth (*Citrullus colocynthis*), referred to in older English translations as "gall".

Aphrodisiacs are referred to in the Old Testament, especially in the famous story of Jacob, Leah, Rachel and the mandrakes. The true mandrake (*Man-*

*dragora officinarum*) has always been associated with many curious legends, customs and superstitions. It furnishes an emetic, purgative and narcotic, and was extensively employed in ancient medicine. Its efficacy, however, probably resulted more from superstitious beliefs concerning it than from actual properties. Its thick taproots have some resemblance in shape to the lower portions of the human body, and it is doubtless due to this fact that amorous and aphrodisiac properties were ascribed to it. The Arabs called it "devil's apples" because of its supposed power to excite voluptuousness. It was thought to stimulate fruitfulness, and has long been famous for its use in love-potions and incantations. The chicory (*Cichorium intybus*) was also regarded as an aphrodisiac and its seeds were used in love-potions.

### Textiles

Most important of all textile plants was, of course, flax (*Linum usitatissimum*). Most of the clothing worn in Bible times which did not consist of animal skins or of wool was made of linen. It is mentioned over a hundred times and is the oldest known of textile fibers. It was used quite generally for all domestic purposes, such as towels (John 13: 4-5), napkins (John 11: 44), girdles and undergarments (Isaiah 3: 23), nets (Isaiah 19: 9), measuring-lines (Ezekiel 40: 3), sails, pennons and flags. It was an important crop in Egypt and was known and used in Canaan before the arrival of the Hebrews (Joshua 2: 6). The most ancient of known mummies are wrapped in linen shrouds, and this practice of burial was adopted also by the Hebrews and Greeks. There were three distinct grades of linen in Bible times, and there were specified uses for each. The ordinary linen of coarsest texture is referred to in Leviticus 6: 10, a superior "twined linen" is mentioned

in Exodus 26: 1, and that of finest texture and costliest quality is mentioned in Esther 8: 15.

The Jews became acquainted with cotton—from *Gossypium herbaceum*—during the period of their captivity in Babylon under King Ahasuerus (598–536 B.C.), whose kingdom extended from India to Ethiopia. Highly colored cotton cloth from India apparently decorated his palace and is referred to in the book of Esther. This is, however, the only reference to cotton in the Bible. Hemp, jute and other plant fibers are not mentioned at all and so were probably unknown. Silk is mentioned three times, during and after the time of Babylonian captivity, so it seems probable that it was not known to the Hebrews until that time. The mulberry existing in Bible lands was *Morus nigra*. Its leaves are not so satisfactory for raising silkworms as are those of the white mulberry. It was not until the introduction of the latter species from China in comparatively recent times that the silkworm industry met with any success in Palestine.

### Fuel and Construction

Naturally, almost all woody plants available were used for firewood and, if of sufficient dimensions, for lumber. The ark of the Tabernacle was made in Sinai of the wood of *Acacia tortilis*. Noah's ark is thought to have been made of *Cupressus sempervirens* var. *horizontalis*. The cherubs in the Holy of Holies of Solomon's Temple were made of the wood of *Elaeagnus angustifolia*. Solomon's Temple, his private house, the House of the Forest of Lebanon, the great Porch of Judgment and the house for Pharaoh's daughter, his favorite wife, all were constructed of *Cedrus libani*, as were his palanquins and essential parts of the mighty fleet maintained at Tyre. The kings of all nations in that area plundered the forests of Leba-

non for the fragrant durable cedar wood to embellish their palaces.

The booths made at the harvest thanksgiving or Succoth festival were of Brutian pine (*Pinus brutia*), myrtle (*Myrtus communis*), olive, date-palm and oleaster. According to II Samuel 6: 5, many of the musical instruments in use by the Hebrews had bases made of Aleppo pine (*Pinus halepensis*). Withes used in basketry and for binding were made from *Salix acmophylla*, *S. alba*, *S. fragilis* and *S. safsaf*. The hedges surrounding their vineyards were most often formed of *Rhamnus palaestina*. The "ebony" of the Bible was the wood of several species of date-plum—*Diospyros ebenaster*, *D. ebenum*, *D. melanoxylon*—native to Ceylon. This exotic wood was carried in Phoenician ships across the Arabian Sea and up to the Red Sea or across the Gulf of Oman and the Persian Gulf to the markets at Tyre, whence it was conveyed by camel caravan overland to Palestine.

Many species of oak grow in the Holy Land and neighboring areas, and at least five are rather definitely referred to in the Scriptures. The oaks of Bashan, for instance, were probably *Quercus aegilops* and *Q. lusitanica*, while the oak of Genesis 35: 4 and 8 was *Q. ilex* and that of Joshua 24: 26 was *Q. coccifera* var. *pseudococcifera*. Besides cedar, Solomon used the wood of the eastern savin (*Sabina excelsa*) and Aleppo pine in the building of the Temple. The "cedar" wood used by the priests in the ceremony of cleansing lepers and leprous houses was *Sabina phoenicia*. Burning this wood or brushes made of its fragrant branches and twigs served the practical purpose of destroying the unpleasant odors which would naturally result from burning the bodies of birds and cows in the sacrificial offerings.

One of the most highly prized woods, imported from northern Africa and used for cabinet work, was the "thyine

wood" of Revelation 18: 12. This was the wood of the sandarac-tree (*Tetraclinis articulata*). Its resinous properties rendered it very slow to decay and almost impervious to the attack of insects. It is the very last vegetable product to be mentioned by name in the Bible. The hard rich yellow or amber-colored wood of the olive was also used extensively in cabinet work and turnery. A kind of turpentine was obtained from the bark of the native terebinth (*Pistacia terebinthus* var. *palaestina*).

### Miscellaneous

The papyrus plant (*Cyperus papyrus*) was used for constructing small vessels for floating on the water (Exodus 2: 3) and for mats and other domestic purposes. It is most famous as the source of the material of which the paper of the ancients was made. Pens for writing on parchment or skins were quite uniformly made from the stems of the reed (*Phragmites communis*). Earlier writing was done on wood (Numbers 17: 3). Writing tablets of boxwood (*Buxus longifolia*) are referred to in II

Esdras 14: 24. Papyrus paper is mentioned in II John 12 and III Maccabees 4: 20.

In a hot climate like that of Egypt, Sinai and Palestine, any shade was always highly prized, and all trees providing it were highly valued. Sycomore-figs were planted along roadsides, gardens were mostly olive orchards, and those Hebrews who could afford to do so "dwelt safely, every man under his vine and under his fig tree". The castorbean (*Ricinus communis*) was widely cultivated to produce quick dense shade. Growing twelve or more feet tall, with huge umbrella-like leaves, it was admirably suited for planting alongside of bowers, booths or huts, or for overhanging a bench. This plant was the "gourd" which brought comforting shade to the afflicted Jonah, but which withered so quickly when a cutworm entered its roots.

One could continue at length about the economic plants of Bible times and peoples, but perhaps the above brief discussion will serve to illustrate the fascination and charm of this phase of economic and historical botany.

### Utilization Abstract

**Eucalypt Tannin.** Of the 500 or so species of *Eucalyptus* indigenous to Australia, *E. astringens*, commercially known as "brown mallet", is the principal one furnishing tannin on that continent. The bark of this tree, native to the southwestern plateau and southern interior of Western Australia, contains 40 to 57% tannin, and about 1,450 tons of it are annually harvested, mainly exported to European and other countries for production of tannin extract. The tannin is easily leached out of the bark with cold water, 90-95% of it being extractable in this manner, whereas only 50-60% is obtainable in this way from quebracho wood, the South American wood which is the world's principal

source of tannin today. In addition, about 65,000 tons of tannin extract, marketed as "Myrtan", are utilized annually after preparation from both wood and bark of two other species of *Eucalyptus*. Several other species also have been utilized as sources of tannin in Australia but not to the extent of brown mallet. And some of them have been introduced into Morocco, Belgian Congo, Union of South Africa and the British colonies in Africa, but exploitation of them as sources of tannin has not progressed to any significant degree. (R. W. Pearman, *Colonial Plant and Animal Products* 3(3): 206. 1952-3).